Groundwater Application Review Summary Form

Application # G- 18414

GW Reviewer DENNIS ORLOWSKI **Date Review Completed:** 7/5/2017

Summary of GW Availability and Injury Review:

[ ] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

[X] There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[ ] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 07/05/2017

FROM: Groundwater Section Dennis Orlowski
Reviewer's Name

SUBJECT: Application G- 18414 Supersedes review of
Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525.* Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. **This review is based upon available information and agency policies in place at the time of evaluation.**

A. GENERAL INFORMATION: Applicant's Name: **David M. Ebner** County: **Marion**

A1. Applicant(s) seek(s) 1.0 cfs from one well(s) in the Willamette Basin, Pudding River subbasin

A2. Proposed use Irrigation (18.3 acres) Seasonality: March 1 – October 31

A3. Well and aquifer data (**attach and number logs for existing wells; mark proposed wells as such under logid**):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	MARI 3090		Alluvium	1.0	T6S/R1W-S9 SE-NE	1779 ft N, 356 ft E fr SE cor DLC 53

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	168	40	29	04/23/2002	190	0-25	0-172		50-170	545	72	Pump

Use data from application for proposed wells.

A4. **Comments:** The proposed POA, Well 1/MARI 3090, has been monitored in the past by OWRD and is referred to as the 'Ebner Upper IR Well (DTS Partnership)'.

Well 1 is located immediately west of the Mt Angel city limits. However, it is not within the Mt Angel Groundwater Limited Area, the nearest boundary of which is approximately ¼ mile to the east, nor is it basalt aquifer well subject to regulation in this GWLA.

A5. ☒ **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ **are**, *or* ☒ **are not**, activated by this application. (Not all basin rules contain such provisions.)
Comments: The proposed POA will produce groundwater from a confined aquifer and therefore the pertinent Willamette Basin rules (OAR 690-502-0240) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments: Not applicable.

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that groundwater* for the proposed use:

a. ☐ **is** over appropriated, ☐ **is not** over appropriated, *or* ☒ **cannot be determined to be** over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;

b. ☐ **will not** *or* ☐ **will** likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;

c. ☐ **will not** *or* ☐ **will** likely to be available within the capacity of the groundwater resource; or

d. ☒ **will, if properly conditioned**, avoid injury to existing groundwater rights or to the groundwater resource:
   i. ☒ The permit should contain condition #(s) **Large water use reporting, 7N (annual measurements)**;
   ii. ☐ The permit should be conditioned as indicated in item 2 below.
   iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

B2. a. ☐ **Condition** to allow groundwater production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;

c. ☒ **Condition** to allow groundwater production only from the **alluvial** groundwater reservoir ~~between approximately _____ ft. and _____ ft. below land surface;~~

d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. **Groundwater availability remarks:** The proposed POA, MARI 3090, obtains groundwater from alluvial sand and gravel deposits confined by 40-50 feet of low-permeability, fine-grained sediments (Willamette Silt). Reported well yields in the proposed POA and nearby similar wells are typically 200-500 gpm.

Groundwater-level data for the past 8-10 years for area wells is sparse; however, data from multiple wells up to 2008 show generally stable trends, which continued through 2017 in measurements from a single well (MARI 58766). However, seasonal ranges in groundwater levels are quite high, on the order of 20-30 feet, and thus seasonal interference with other groundwater users is possible. Consequently, if a permit is granted the large water-use reporting and 7N annual measurement conditions are recommended to protect other users and the groundwater resource in general.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	**Alluvium (Willamette Aquifer)**	☒	☐

Basis for aquifer confinement evaluation: Proposed Well 1 will tap water-bearing sands and gravels that are confined by 40-50 feet of low-permeability, fine-grained sediments (Willamette Silt). In the central Willamette Valley, Conlon and others (2005) report that fine-grained deposits (silt and clay) of 'more than 40 ft' thickness typically create confined conditions in the underlying water-bearing sand/gravel deposits. Additionally, static water levels in the proposed POA (MARI 3090) are above the level of water-bearing layers. These factors suggest that proposed Well 1 will produce from a confined aquifer.

C2. **690-09-040 (2) (3):** Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	1	**Unnamed tributary to Pudding River**	**140**	**130-140**	**2950**	☒	☐	☐	☐	☒
1	2	**Pudding River**	**140**	**135-140**	**4470**	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Water level elevations in the alluvial aquifer are essentially equivalent to the elevations of SW1 and SW2 within approximately one mile of Well 1. Furthermore, water table maps in the area indicate that groundwater in the alluvial aquifer system flows towards and discharges into local streams incised in Willamette Silt (Conlon and others, 2005; Gannett and Caldwell, 1998). These facts indicate that the alluvial aquifer and local streams are hydraulically connected.

The depletion of local streams by proposed Well 1 will be attenuated, but not eliminated, by the low vertical hydraulic conductivity (permeability) of the Willamette Silt and other clays and silts that lie between the deeper sands and gravels and the stream beds. Net impacts will be small at the onset of pumping but will increase with time until a new equilibrium between local recharge and discharge is reached. At that time depletion is expected to be relatively constant throughout the year.

Water Availability Basin the well(s) are located within:
SW1 & SW2: Pudding River > Molalla River – above Mill Creek (WID 151)
SW2 only: Pudding River > Molalla River above Howell Prairie (WID 152).

C3a. **690-09-040 (4):** Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% *natural* flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
1	1	☐	☐	**N/A**	**N/A**	☐	**67.30**	☒	**<<25%**	☒
1	2	☐	☐	**MF152A**	**10.00**	☒	**22.70**	☒	**See comment**	☒

C3b. **690-09-040 (4):** Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐

Comments:

C3a: The requested allocation, Qw, of 1.0 cfs exceeds 1% of both the ISWR and 80% natural flows for SW2, and 80% flow for SW1, and thus PSI is assumed for both criteria.

Potential interference of SW1 (unnamed tributary to the Pudding River) at 30 days was estimated using the Hunt 2003 analytical stream depletion model (Hunt, 2003). This interference evaluation was limited to SW1 because it is in the same WAB as the nearest reach of SW2 and is also nearer to the proposed POA. Aquifer parameters used for the model are typical of those reported for this hydrogeologic regime, including an aquifer hydraulic conductivity estimated from a specific capacity value reported for the proposed POA (MARI 3090) (Conlon and others, 2003, 2005; Iverson, 2002; Woodward and others, 1998). The Hunt 2003 analytical modeling results indicate that depletion of SW1 is expected to be substantially less than 25% (of well discharge) after 30 days of continuous pumping.

C3b: Not applicable.

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													

Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
(A) = Total Interf.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation: Not applicable.

C4b. **690-09-040 (5) (b) The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.**

C5. ☒ **If properly conditioned**, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

i. ☐ The permit should contain condition #(s)_____;

ii. ☒ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:**

As discussed in Sections C3a and C3b of this review, PSI with SW1 (unnamed tributary to the Pudding River) and with SW2 (mainstem Pudding River) was determined because the requested allocation (1.0 cfs) exceeds 1% of both the ISWR and 80% natural flows for both surface water sources. The most limiting of these criteria is the 10.00 cfs ISWR on SW2 (MF152A). Thus reducing the requested allocation to less than 0.10 cfs (~45 gpm) would avoid PSI on this and the other bases.

References Used:

Application file: G-18414.

Conlon, T.D., Wozniak, K.C., Woodcock, D., Herrera, N.B., Fisher, B.J., Morgan, D.S., Lee, K.K., and Hinkle, S.R., 2005, Ground-water hydrology of the Willamette Basin, Oregon: U.S. Geological Survey Scientific Investigations Report 2005-5168.

Conlon, T.D., Lee, K.K., and Risley, J.R., 2003, Heat tracing in streams in the central Willamette Basin, Oregon, *in* Stonestrom, D.A. and Constantz, Jim, eds., Heat as a tool for studying the movement of groundwater near streams: U.S. Geological Survey Circular 1260, chapter 5, p. 29-34.

Gannett, M.W. and Caldwell, R., 1998, Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A, 32 p.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, January/February, 2003.

Iverson, J., 2002, Investigation of the hydraulic, physical, and chemical buffering capacity of Missoula flood deposits for water quality and supply in the Willamette Valley of Oregon: Unpublished M.S. thesis, Oregon State University, 147 p.

Woodward, D.G., Gannett, M.W., and Vaccaro, J.J., 1998, Hydrogeologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B, 82 p.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** _____ **Logid:** _____

D2. **THE WELL does not appear to meet current well construction standards based upon:**

a. ☐ review of the well log;
b. ☐ field inspection by _____;
c. ☐ report of CWRE _____;
d. ☐ other: (specify) _____

D3. **THE WELL construction deficiency or other comment is described as follows:** _____

D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Water Availability Tables

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Detailed Reports

PUDDING R > MOLALLA R - AB MILL CR
WILLAMETTE BASIN
Water Availability as of 6/28/2017

Watershed ID #: 151 (Map)
Date: 6/28/2017

Exceedance Level: 50%
Time: 10:50 AM

Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

Water Availability Calculation

Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,040.00	124.00	916.00	0.00	36.00	880.00
FEB	1,160.00	114.00	1,070.00	0.00	36.00	1,030.00
MAR	1,010.00	75.70	934.00	0.00	36.00	898.00
APR	787.00	51.60	736.00	0.00	36.00	695.00
MAY	425.00	48.90	376.00	0.00	36.00	340.00
JUN	224.00	69.90	154.00	0.00	36.00	118.00
JUL	109.00	110.00	-0.97	0.00	36.00	-37.00
AUG	71.00	90.20	-19.20	0.00	36.00	-55.20
SEP	67.30	51.40	15.90	0.00	36.00	-20.10
OCT	91.60	11.00	80.60	0.00	36.00	44.60
NOV	363.00	48.30	315.00	0.00	36.00	279.00
DEC	957.00	118.00	839.00	0.00	36.00	803.00
ANN	706,000.00	55,100.00	651,000.00	0.00	26,100.00	627,000.00

Oregon Water Resources Department
Water Availability Analysis

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Water Availability Analysis
Detailed Reports

PUDDING R > MOLALLA R - AB HOWELL PRAIRIE
WILLAMETTE BASIN
Water Availability as of 6/28/2017

Watershed ID #: 152 (Map)
Date: 6/28/2017

Exceedance Level: 50%
Time: 1:03 PM

Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations
Water Rights | Watershed Characteristics

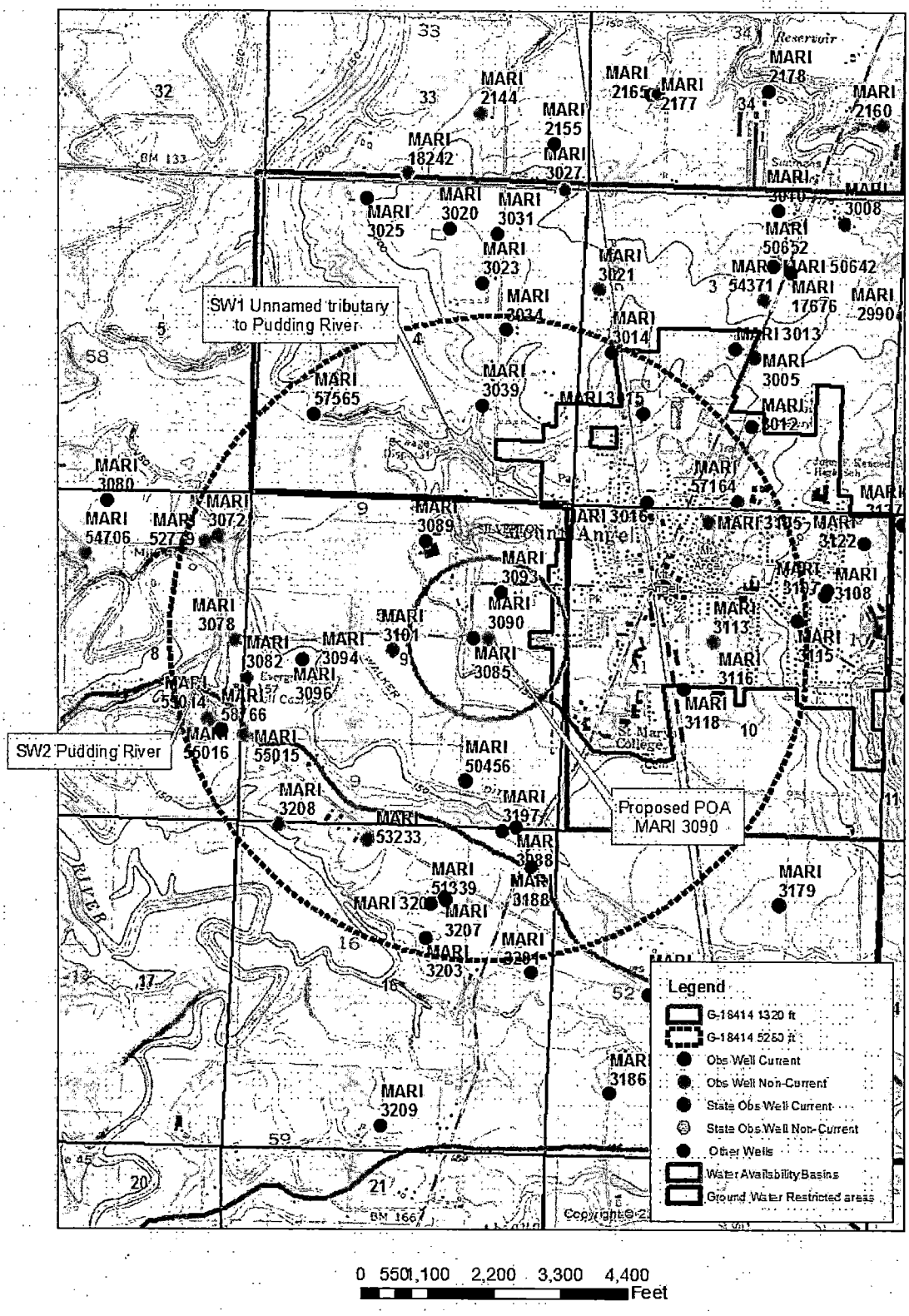
Water Availability Calculation

Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

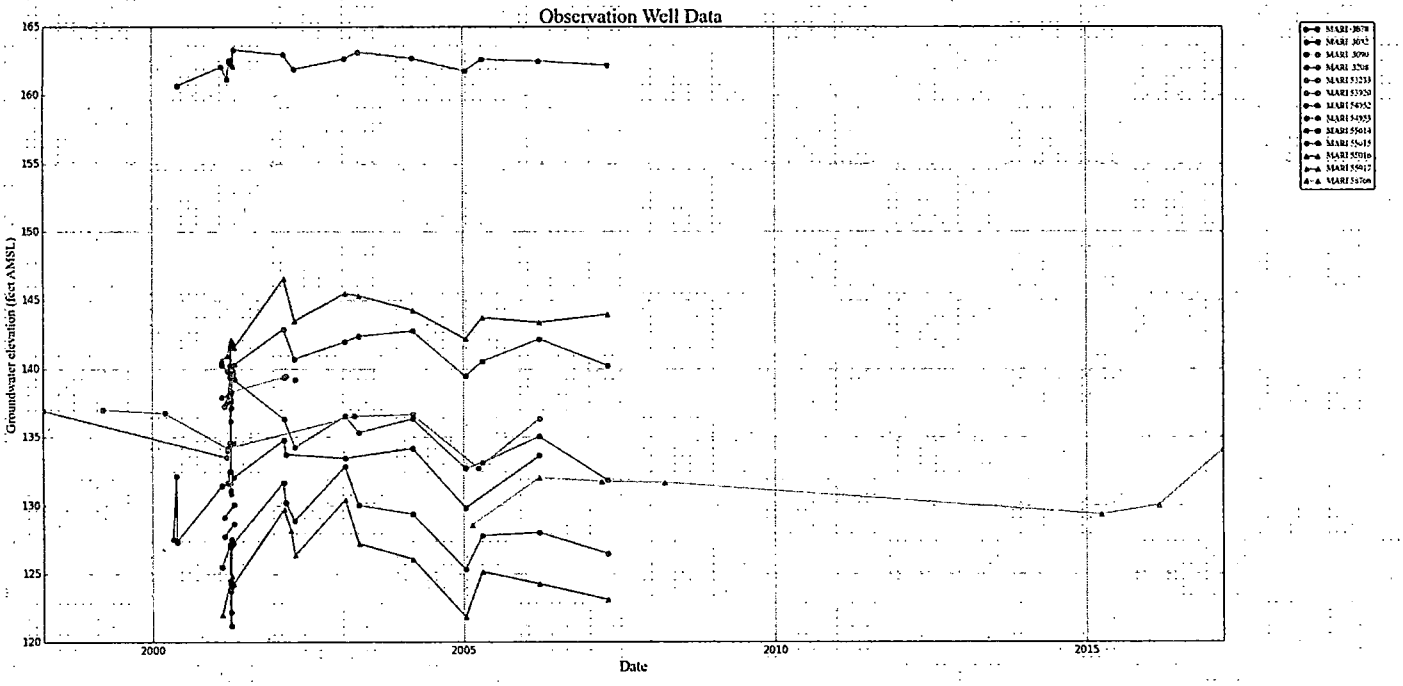
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	603.00	69.80	533.00	0.00	10.00	523.00
FEB	649.00	60.90	588.00	0.00	10.00	578.00
MAR	587.00	40.00	547.00	0.00	10.00	537.00
APR	451.00	21.40	430.00	0.00	10.00	420.00
MAY	235.00	14.30	221.00	0.00	10.00	211.00
JUN	111.00	29.30	81.70	0.00	10.00	71.70
JUL	43.60	44.80	-1.17	0.00	10.00	-11.20
AUG	24.70	37.20	-12.50	0.00	10.00	-22.50
SEP	22.70	22.30	0.42	0.00	10.00	-9.58
OCT	38.90	4.35	34.50	0.00	10.00	24.50
NOV	233.00	18.80	214.00	0.00	10.00	204.00
DEC	608.00	63.80	544.00	0.00	10.00	534.00
ANN	365,000.00	25,700.00	360,000.00	0.00	7,240.00	353,000.00

Well Location Map

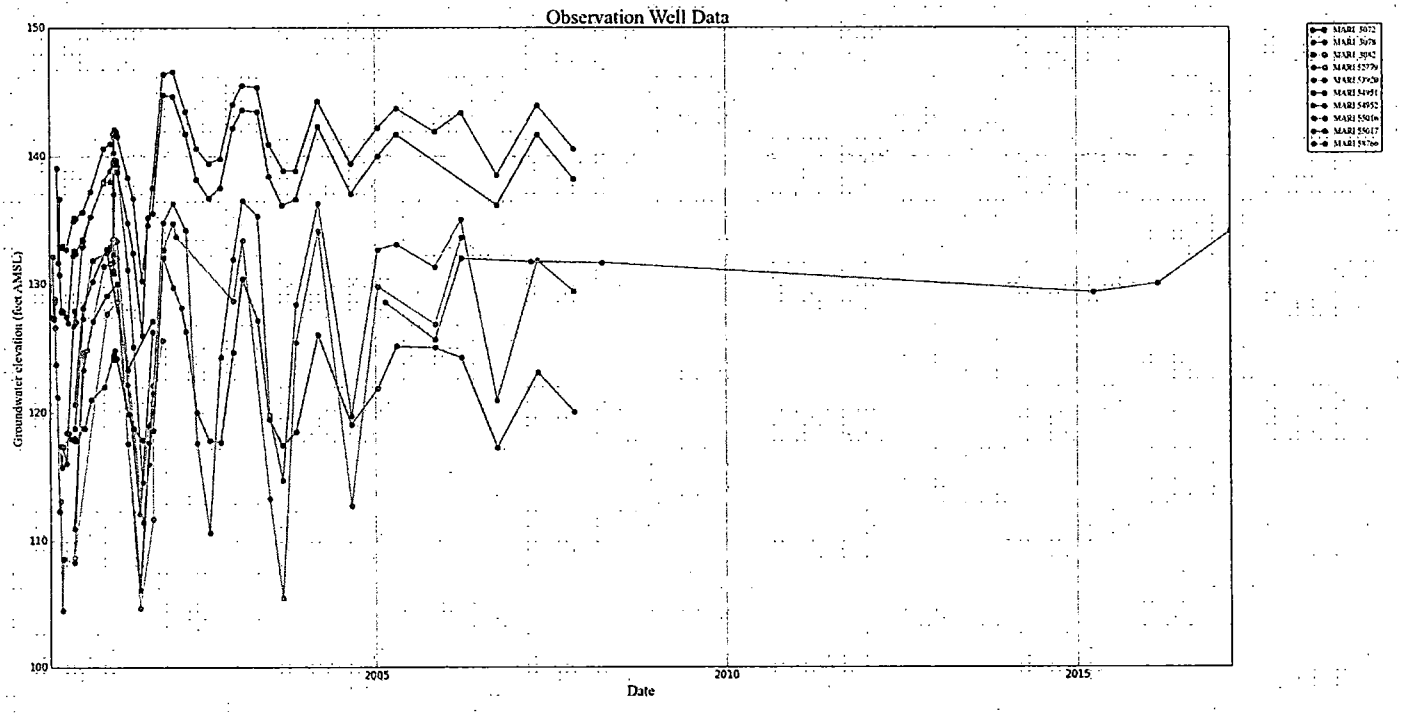
App G-18414 Ebner



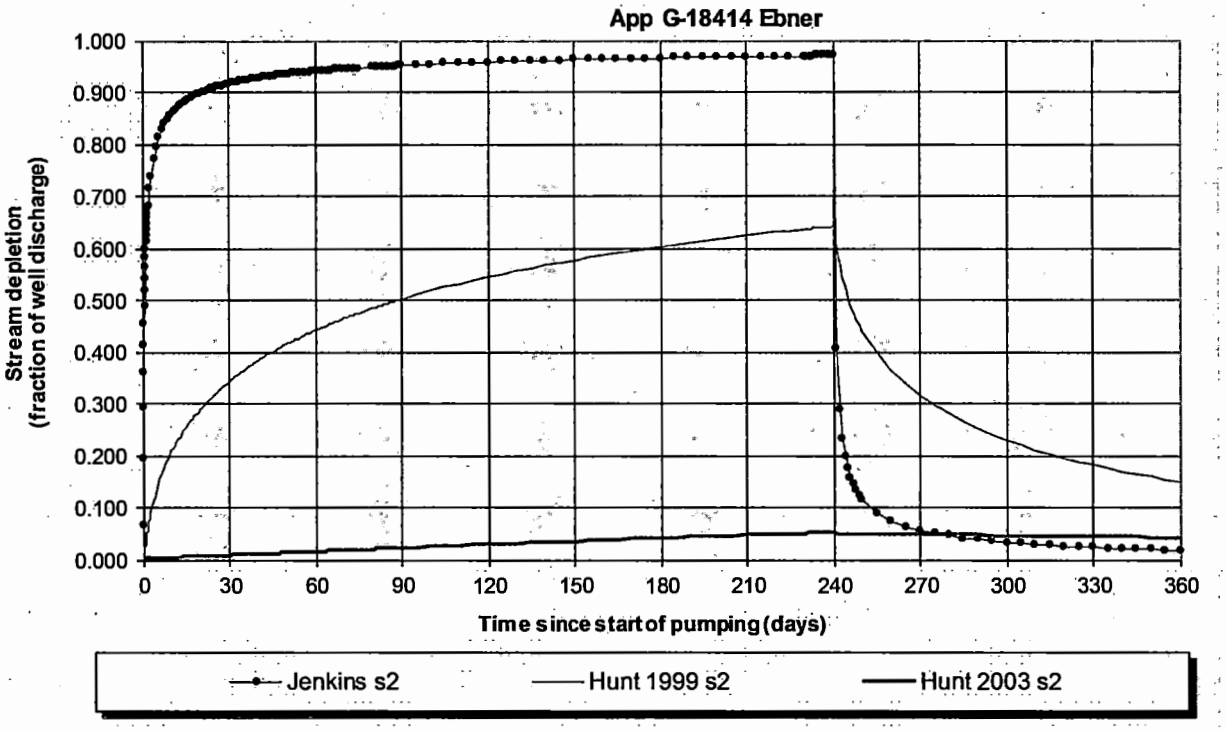
Water-Level Trends in Nearby Wells – SWL, Jan-May only



Water-Level Trends in Nearby Wells – SWL, year-round



Stream Depletion Model Results



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 240 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	91.6%	94.0%	95.1%	95.8%	96.2%	96.6%	96.8%	97.0%	5.6%	3.3%	2.3%	1.8%
H SD 1999	34.3%	44.2%	50.2%	54.4%	57.7%	60.2%	62.4%	64.2%	31.5%	22.9%	18.2%	15.0%
H SD 2003	0.93%	1.62%	2.29%	2.95%	3.57%	4.17%	4.73%	5.27%	4.85%	4.65%	4.44%	4.24%
Qw, cfs	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
H SD 99, cfs	0.343	0.442	0.502	0.544	0.577	0.602	0.624	0.642	0.315	0.229	0.182	0.150
H SD 03, cfs	0.009	0.016	0.023	0.029	0.036	0.042	0.047	0.053	0.048	0.047	0.044	0.042

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.00	1.00	1.00	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2950	2950	2950	ft
Well depth	d	172	172	172	ft
Aquifer hydraulic conductivity	K	10	100	500	ft/day
Aquifer saturated thickness	b	130	130	130	ft
Aquifer transmissivity	T	1300	13000	65000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.1	0.1	0.1	ft/day
Aquitard saturated thickness	ba	12	12	12	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.666667	0.666667	0.666667	ft/day
Stream depletion factor	sdf	6.694231	0.669423	0.133885	days
Streambed factor	sbf	1.512821	0.151282	0.030256	
input #1 for Hunt's Q_4 function	t'	0.149382	1.493824	7.469118	
input #2 for Hunt's Q_4 function	K'	55.785256	5.578526	1.115705	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	1.512821	0.151282	0.030256	